

What is claimed is:

1 1. Computer executable software and device for guiding brain activity training
2 comprising:
3 logic which takes data corresponding to activity measurements of one or more internal
4 voxels of a brain and determines one or more members of the group consisting of: a) what
5 next stimulus to communicate to the subject, b) what next behavior to instruct the subject to
6 perform, c) when a subject is to be exposed to a next stimulus, d) when the subject is to
7 perform a next behavior, e) one or more activity metrics computed from the measured
8 activity, f) a spatial pattern computed from the measured activity, g) a location of a region of
9 interest computed from the measured activity, h) performance targets that a subject is to
10 achieve computed from the measured activity, i) a performance measure of a subject's success
11 computed from the measured activity, j) a subject's position relative to an activity
12 measurement instrument; and

13 logic for communicating information based on the determinations to the subject in
14 substantially real time relative to when the activity is measured.

15 2. The software and device according to claim 1 wherein measuring brain
16 activity is performed by fMRI.

17 3. The software and device according to claim 1 wherein the determinations are
18 made in less than 10 seconds relative to when the activity is measured.

19 4. The software and device according to claim 1 wherein the determinations are
20 made in less than 1 second relative to when the activity is measured.

21 5. The software and device according to claim 1 wherein the determinations are
22 made in less than 0.5 second relative to when the activity is measured.

23 6. The software and device according to claim 1 wherein the information is
24 determined while the instrument used for measurement remains positioned about the subject.

25 7. The software and device according to claim 1 wherein the activity

2 measurements are made using a device capable of taking measurements from one or more
3 internal voxels without substantial contamination of the measurements by activity from
4 regions intervening between the internal voxels being measured and where the measurement
5 apparatus collects the data.

1 8. The software and device according to claim 1 wherein measurements are made
2 from at least 100 separate internal voxels, and these measurements are made at a rate of at
3 least once every five seconds.

1 9. The software and device according to claim 1 wherein measurements are made
2 from a set of separate internal voxels corresponding to a scan volume including the entire
3 brain.

1 10. The software and device according to claim 1 wherein the size of the internal
2 voxels have a total three dimensional volume of 5x5x5cm or less.

1 11. The software and device according to claim 1 wherein the size of the internal
2 voxels have a total three dimensional volume of 1x1x1cm or less.

1 12. The software and device according to claim 1 wherein the software further
2 comprises logic for selecting one or more of the internal voxels to correspond to a region of
3 interest for the subject and using the selected internal voxels of the region of interest to make
4 the one or more determinations.

1 13. The software and device according to claim 1 wherein the information is
2 communicated by a manner selected from the group consisting of providing audio to the
3 subject, providing tactile stimuli to the subject, providing a smell to the subject, displaying an
4 image to the subject.

1 14. The software and device according to claim 1 wherein the information
2 communicated is an instruction to the subject.

1 15. The software and device according to claim 14 wherein the instruction is a text
2 or iconic indication denoting an action that a subject is to perform.

- 1 16. The software and device according to claim 14 wherein the instruction
2 identifies a task to be performed by the subject.
- 1 17. The software and device according to claim 14 wherein the instruction is
2 determined by computer executable logic.
- 1 18. The software and device according to claim 17 wherein the instruction
2 communicated is selected from a set of instructions stored in memory, the selection being
3 based upon the brain activity measured.
- 1 19. The software and device according to claim 1 wherein some of the information
communicated to the subject is material to be learned.
20. A method comprising:
 (a) measuring activity of one or more internal voxels of a brain;
 (b) communicating instructions to a subject derived from that measured activity in
substantially real time relative to when the behavior is performed; and
 (c) having the subject perform a behavior in response to receiving the instructions.
21. A method according to claim 20 wherein measuring brain activity is
performed by fMRI.
- 1 22. A method according to claim 20 wherein measurements are made from at least
2 100 separate voxels.
- 1 23. A method according to claim 20 wherein the instructions are derived through a
2 computer executable logic process of selecting from a set of possible instructions based upon
3 the brain activity measured.
- 1 24. A computer assisted method comprising:
2 measuring activity of one or more interior volumes of a brain;
3 employing computer executable logic that takes the measured brain activity and
4 determines information to communicate to the subject; and
5 communicating the determined information to the subject;

6 wherein the determined information is communicated to the subject in substantially
7 real time relative to when the activity is measured.

1 25. A method according to claim 24, wherein computer executable logic is
2 employed to cause the information to be communicated to the subject.

1 26. Computer executable software, the software comprising:
2 logic for taking activity measurements of one or more localized brain regions as a
3 behavior is performed; and
4 logic for communicating information to the subject based on the measured brain
5 activity in substantially real time relative to when the behavior is performed;
6 wherein the logic takes new activity measurements as they are received and communicates
7 new information based on the new activity measurements.

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